November, 1958 Extension Bulletin 380

Meadow and Pasture *SEEDINGS*

Ohio Agricultural Experiment Station
Agricultural Extension Service
The Ohio State University

Contents

Acknowledgment: The illustrations of alfalfa and birdsfoot trefoil are from "Legume Culture and Picture Identification" by Herbert B. Hartwig, Agronomy Department, Cornell University (1953); the illustrations of timothy and orchardgrass are from the "Manual of the Grasses of the United States" by A. S. Hitchcock, U.S.D.A. (1950); and the illustration of smooth bromegrass is from the 1948 yearbook of agriculture of the U.S.D.A.

11/58—10M

Printed and distributed in furtherance of acts of May 8 and June 30, 1914. Agricultural Extension Service, W. B. Wood, director, Columbus 10, Ohio. The Ohio State University and U. S. Department of Agriculture cooperating.

Supplement to Extension Bulletin 347, Crop Varieties and Corn Hybrids for Ohio

By Lewis C. Saboe

Suggested Rates* and Date of Seeding Important Ohio Crops

Crop	Pounds of Seed per Bushel	Rate to Plant per Acre (Lbs.)	DATE TO PLANT	
			In Northern Ohio	In Southern Ohio
Alfalfa*	60	10–12	Mar. 10–Apr. 20 or July 1–Aug. 15	Mar. 1–Apr. 15 or July 1–Sept. 1
Barley, Winter	48	80–100	Sept. 15–25	Sept. 15–Oct. 5
Birdsfoot Trefoil	60	4–6	Mar. 10–Apr. 20	Mar. 1–Apr. 15
Bromegrass*	14	6	Aug. 1–Sept. 15 or March–April	Aug. 1–Sept. 30 or March–April
Corn, dent	56	10–15	May 10–June 5	May 1–May 31
Corn, sweet	45	8–12	May 1–June 25	Apr. 20–June 25
Corn, pop	56	4–6	May 10–June 5	May 1–May 31
Clover, alsike*	60	4–5	March–April or July 15–Aug. 15	March or August
Clover, medium* or mammoth red	60	8–10	March–April or July 15–Aug. 15	March or August
Clover, ladino	60	1–2	March–April	March or August
Fescue, tall		8–10	March–April or August–Sept.	March–April or August–Sept.
Lespedeza, Korean	40–45	6–12	Do not use	Feb. 15–Mar. 31
Oats, spring	32	50–80	Mar. 15–Apr. 20	Mar. 1–Apr. 15
Orchardgrass*	14	5	Mar. 15–Apr. 30 or August	March–April or August–Sept.
Rye	56	84–112	Sept. 1–Oct. 15	Sept. 10–Oct. 20
Ryegrass		15–20	June 15–Aug. 15 or March–April	June 15–Oct. 1 or March–April
Sorghum	50	5–8	June 1–20	May 20–June 30
Soybeans	60	30–60 in rows 90–120 drilled solid	May 10–31	May 1–June 10
			May 20–June 15	May 15–June 20
Sweetclover, scarified	60	10–12	Mar. 15–Apr. 30 (Yellow also in June–July)	Mar 15–Apr. 15 (Yellow also in June–July)
Sudangrass		25	June 1–20	May 20–June 30
Wheat	60	90–120	Sept. 22–Oct. 10	Sept. 28–Oct. 15
Timothy*	45	5 (fall), or 10 (spring)	August–Sept. or March–April	August–Oct. 15 or March–April

*The rates for these forage crops when seeded alone are higher than those recommended in meadow crops mixtures. For detailed information on seeding rates in mixtures consult Extension Bulletin 380 "Meadow and Pasture Seedings." Reprinted, 1959.

The Ohio State University and U. S. Department of Agriculture Cooperating.
Agricultural Extension Service, W. B. Wood, Director, Columbus, Ohio.
Printed and distributed in furtherance of Acts of May 8 and June 30, 1914.

Meadow and Pasture *SEEDINGS*

by

G. R. Gist, J. L. Parsons, R. R. Davis, C. J. Willard[1]

The first consideration in choosing a forage seeding is its intended use. In this publication seeding recommendations are grouped according to their usefulness for specific purposes: 1) seedings for hay, pasture and silage on rotation cropland, 2) seedings for pasture with an occasional harvest as hay or silage, 3) seedings for special pastures including pasture for poultry and swine, and annual pastures for general livestock, 4) seedings for cover or green manure crops.

Soil drainage is the second consideration in choosing a forage seeding mixture. The better the drainage, either natural or artificial, the better will be the growth of alfalfa and red clover, and the longer alfalfa will remain in the stand. Although excess water can be removed from many fields by surface or tile drains, there are situations in which it is not practical to install drainage systems which will permit satisfactory growth of alfalfa. Ladino clover and birdsfoot trefoil are tolerant of poor soil drainage. Reed canarygrass and redtop will grow on soils which are too wet to support other grasses.

The pH of the surface soil must be considered in making legume seedings. Alfalfa and sweet clover make satisfactory growth only on soils having pH values of 6.5 or higher. Red clover, alsike clover, ladino clover, and birdsfoot trefoil will grow on soils somewhat too acid for alfalfa and sweet clover. These legumes grow best, however, when the pH of the surface soil is in the range from 6.5 to 7.0.

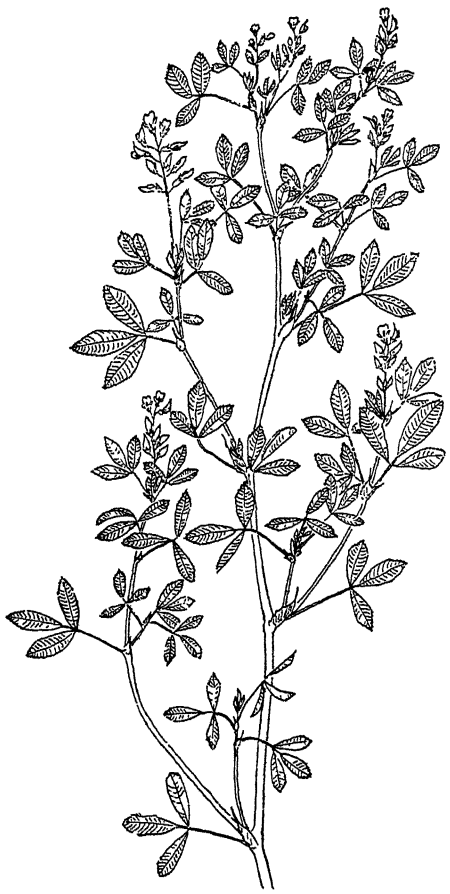
Soil tests are the only reliable guide to the pH of soils. When soil tests indicate a need for lime, this lime should be applied prior to making the forage seeding. Seedings on low-lime soils are usually unprofitable.

[1] Department of Agronomy, The Ohio State University and The Ohio Agricultural Experiment Station. In addition to the authors, many present and former members of the Agronomy staff have contributed to this bulletin. Their suggestions are gratefully acknowledged.

Forage Species

Alfalfa

Alfalfa has the highest yield potential of the legumes grown in Ohio for hay, silage or pasture. It is unexcelled in drought tolerance. For best production, alfalfa requires excellent surface drainage, good internal soil drainage and a soil reaction of pH 6.5 or higher. Stands are quickly destroyed by improper cutting or grazing.



Alfalfa

Alfalfa fixes large quantities of atmospheric nitrogen, thus increasing the nitrogen level of soils and raising protein content of grasses grown in association with it.

Alfalfa is not as easily established in wheat as is red clover; stands of alfalfa from seedings in oats frequently are better than those of seedings made in wheat. Alfalfa is much more successful in summer seedings than are clovers or birdsfoot trefoil.

Non-hardy (southern) types of alfalfa are the best substitute for sweetclover in areas where sweetclover weevil makes successful seedings of sweetclover hazardous, and chemical control of the weevil is not practiced. Non-hardy alfalfas frequently winterkill, but this is not objectionable when they are used strictly for green manure. These alfalfas fix less nitrogen than a good sweetclover green manure crop. They are also useful where weeds are likely to be a problem; alfalfa may be clipped during the seeding year to control weeds whereas clipping of sweetclover results in a serious reduction in its value as a green manure crop.

For seeding mixtures containing alfalfa see pages 12–16.

Birdsfoot Trefoil

Birdsfoot trefoil is primarily a pasture legume. It is adapted to a wide range of soil conditions; under rotational grazing, stands of birdsfoot trefoil should survive almost indefinitely. It should be seeded only in fields to remain in sod for several years.

Once established, birdsfoot trefoil will grow on soils too wet for best growth

of alfalfa; it is much less susceptible to winter heaving than are alfalfa or sweetclover. Although birdsfot trefoil will grow at pH levels too low to support satisfactory stands of alfalfa, it makes best growth at a soil reaction of pH 6.5 to 7.0.

Birdsfoot trefoil should not be seeded with alfalfa or clovers; these legumes start quickly and crowd out the slower growing birdsfoot seedlings. Unusual care in inoculation is essential in establishing birdsfoot trefoil.

Birdsfoot trefoil should be seeded during the early spring with spring oats or without a companion grain crop. Summer seedings frequently do not survive the first winter.

Low-Growing types. Empire birdsfoot trefoil is the only variety of the low-growing type of which seed is currently available. Fields of Empire birdsfoot have been grazed for 20 or more years with no decrease in the birdsfoot stand. Birdsfoot trefoil can, however, be killed by continuous close grazing with sheep and probably with cattle. Low-growing types withstand close grazing better than the upright types. Both types produce more total forage under rotational than under continuous grazing.

Upright types. Several varieties of upright-growing birdsfoot trefoil are available. These have more seedling vigor than the low-growing types but make much less seedling growth than legumes such as alfalfa, red or ladino white clover. The upright types recover more quickly after grazing or clipping than the low-growing types. Upright types of birdsfoot trefoil should be used where an occasional harvest may be removed as hay or silage.

On soils well adapted to alfalfa, birdsfoot trefoil has yielded two-thirds to three-fourths as much hay per acre as alfalfa. Where alfalfa does not do well, birdsfoot hay yields may exceed those of alfalfa.

Birdsfoot Trefoil

For seeding mixtures containing birdsfoot trefoil see pages 13 and 14.

Clovers

Alsike. Alsike clover is a perennial but it often treated agriculturally as a biennial. Alsike clover grows well on heavy, wet soils but is extremely sensitive to heat and drought. Alsike usually produces only one hay cutting each year. Its habit

of growth is similar to red clover except that its stems are much weaker and will lodge if they grow more than 12 to 15 inches high. Since the introduction of ladino white clover and birdsfoot trefoil, use of alsike clover in Ohio has been greatly reduced. Alsike clover is not recommended for inclusion in general seeding mixtures.

Medium Red. Medium red clover is a perennial which acts as a biennial in actual farm practice. The clover root borer and diseases kill many plants after the first cutting of the first hay year. If left over the second winter, winter injury combined with diseases and the clover root borer further deplete the stand.

Red clover normally produces two cuttings during the first hay year. The first cutting hay yield is usually as high as that from alfalfa.

Red clover grows on soils with pH values below those necessary for satisfactory production of alfalfa and sweetclover. It is more readily established in wheat or other winter grains than is alfalfa. Red clover may be seeded in oats. It is not adapted to summer seeding.

For seeding mixtures containing medium red clover see page 13.

Mammoth Red. Mammoth is a variety of red clover. It differs from medium red in that it is later maturing, recovers slowly after cutting and makes only one good hay cutting a year. Mammoth yields more at the first cutting than medium red because it grows two to three weeks longer, but its total yield for the season is usually less than medium red. Contrary to popular opinion, mammoth does not have a larger root system than medium red. There is little, if any, place for mammoth red clover in forage seedings in Ohio.

White. Common white clover is a perennial legume which volunteers into Ohio pastures that are adequately limed, well fertilized, and closely grazed. Because common white clover readily volunteers into pastures under conditions favorable for its growth, seeding it for pasture is not recommended in Ohio.

Ladino. Ladino is a giant variety of white clover like common except that it is larger in every respect; it is a shallow-rooted perennial legume, which makes little or no production during periods of drouth. Under high moisture conditions necessary for maximum growth, ladino is a high-yielding clover. Ladino is most useful as a pasture legume. It is difficult to cure as hay.

Ladino clover should be seeded in the same manner as medium red clover. Satisfactory stands may be obtained in either winter or spring grains; summer seedings seldom are successful. Ladino may be grown successfully on soils with pH values too low to support satisfactory stands of alfalfa or sweetclover.

For seeding mixtures containing ladino clover see pages 14–16.

Lespedeza

Korean lespedeza is a shallow-rooted annual which must come from seed each year. It germinates in March but is not large enough to graze until early July. Inoculated Korean lespedeza may be sown during March south of U. S. Highway 50 on pastures in which there is considerable bare ground. It will exist on very poor soils but requires lime and phosphate to make any appreciable yield. After lime and phosphate have been applied, other legumes are more profitable. Once bluegrass occupies the area, lespedeza cannot be established in it. Although considerable pasture can be obtained from lespedeza seeded on pastures where bare ground is exposed, it is not recommended for use in general pasture seedings.

Sericea is a perennial lespedeza which may be used as a soil-building legume on strip-mine spoil banks or as a food plant for wildlife. The top growth of sericea is killed back to the ground in winter, and new growth comes each spring from the crown. It is a woody plant of little value as hay or pasture.

For seeding mixtures containing lespedeza see page 15.

Sweetclover

Sweetclover is most useful as a green manure crop seeded in small grains. Although satisfactory stands and considerable top growth may be obtained from seedings in corn, such seedings make little root growth and frequently heave out over winter. Sweetclover seeded in corn fixes only small quantities of nitrogen.

Sweetclovers are extremely sensitive to soil reaction; for satisfactory growth the pH of the surface soil must be 6.5 or higher. With a suitable soil pH sweetclovers will stand drought about as well as alfalfa and shade nearly as well as red clover. They will make satisfactory summer growth on wet soils but are likely to heave out over winter.

The biennial sweetclovers do not bloom during the seeding year. In the second year they make a very rapid growth, form seed and die. Much of the material for the second-year growth is stored in the roots of the plant during the first year. This concentration of material in the roots makes them especially useful as green manure crops. Sweetclovers are of little value for hay because the stems are coarse and hard to cure. Furthermore, if the hay is not well-cured it frequently is poisonous to cattle.

In general the adaptations and uses of **biennial white** and **biennial yellow** sweetclover are the same. The commercial yellow is earlier maturing than the standard white. Yellow sweetclover always puts a higher proportion of the total first year's growth into the roots than does white. Yellow sweetclover has much greater ability to establish itself in dry seasons and dry seedbeds than white sweetclover.

Sweetclover may be broadcast or drilled in small grains during the early spring. The seeding **should not be clipped** following grain harvest as this results in a great reduction in the value of the crop as a green manure.

Since 1943, the sweetclover weevil has destroyed many sweetclover seedings. This insect can and should be controlled. (See Extension publication, "Sweetclover Weevil.") Sweetclover is too valuable a green manure legume to give up because of insect attacks.

For seeding mixtures containing sweetclover see page 16.

Vetch

Hairy vetch is sometimes seeded in corn as a green manure crop. It is best sown during late June or early July. Vetch makes some growth during the late summer and fall, lives through the winter, and makes a vigorous spring growth. Vetch should not be plowed under before mid-May; it fixes little nitrogen unless it is permitted to make considerable spring growth.

Hairy vetch should never be permitted to mature seed. The plant has a high percentage of hard seeds which will volunteer for many years. Volunteer vetch in wheat is serious both because it makes combining difficult and because it is difficult to separate the vetch from the wheat. It is in every way as bad as cockle.

Stands of vetch frequently are badly damaged or completely killed over the winter by diseases. Vetch is not recommended for routine cover crop seedings in Ohio.

Bluegrass

Kentucky bluegrass is the dominant grass in well treated permanent pastures in Ohio. Bluegrass pastures are more permanent and require less careful management than the taller grass pastures. They also permit pasturing under wetter conditions than is advisable with orchardgrass, meadow fescue or timothy.

Kentucky bluegrass is a perennial grass which eventually volunteers into almost all forage crop seedings. Contrary to popular opinion, bluegrass does not "crowd out" alfalfa; rather it replaces alfalfa and other legumes or grasses as they die out. Kentucky bluegrass is a shallow-rooted, cool season grass which stops growth during periods of high temperature and low soil moisture. For best production bluegrass should be heavily grazed during the period of its maximum spring growth.

Because bluegrass readily volunteers into forage seedings its inclusion in seeding mixtures is advisable only in special situations. In most instances it is better practice to seed one of the taller growing grasses with legumes and permit the bluegrass to volunteer into the stand as these tall growing species die out. Bluegrass may be seeded with birdsfoot trefoil where a birdsfoot-bluegrass pasture is desired.

For seeding recommendations containing bluegrass see page 14.

Bromegrass

Smooth. When grown with alfalfa, smooth bromegrass produces high yields of excellent quality forage which may be used for hay, silage, or pasture. It is a deep-rooted perennial grass which matures somewhat earlier and makes more regrowth than timothy. Bromegrass is extremely palatable and holds its lower leaves at maturity much better than

Smooth Bromegras

timothy or orchardgrass. For satisfactory growth bromegrass requires large quantities of nitrogen and if not growing with a vigorous legume it should be fertilized with high nitrogen fertilizers.

Special care must be exercised in seeding bromegrass; many seeding failures have resulted from covering bromegrass seed too deep. It can be sown successfully in spring oats or in summer seedings. When winter wheat is planted on or before the fly-safe date, bromegrass may be seeded with the wheat; when wheat planting is delayed bromegrass may be drilled into the wheat during the following spring. Bromegrass may be seeded with a special seeder or with a standard grain drill by mixing the bromegrass seed with fertilizers or with small grains. It is extremely difficult to obtain a uniform seed-

ing by broadcasting the seed or by seeding it through the grass-seed box of the ordinary grain drill.

For seeding mixtures containing smooth bromegrass see pages 12–14.

Field (Annual). Field bromegrass has recently been introduced into Ohio for use as a green manure crop seeded in corn. It is an annual which grows from seed each year. When seeded in corn at the last cultivation, annual bromegrass makes considerable fall growth, remains alive over winter and produces seed during June of the following year.

Field bromegrass is a close relative of cheat or chess. Although it possesses many characteristics which make it a desirable cover crop in corn, if care is not exercised it can become a serious weed. It should never be allowed to produce seed.

For seeding recommendations containing field bromegrass see page 16.

Fescue

Alta and Kentucky 31 are nearly identical varieties of tall fescue. The grass is a perennial which is readily established and grows well on practically all Ohio soils. It is definitely unpalatable; livestock will not make as large gains or produce as much milk on fescue pastures as on most other grass pastures.

Tall fescue is a useful grass for seeding in waterways and in areas which receive heavy traffic from livestock or farm machinery. It is a tough sod-forming grass which will withstand considerable tramping or heavy traffic.

Meadow fescue is a smaller growing plant than the tall fescues. Meadow fescue is generally inferior to the tall fescues for use in waterways and in areas subjected to heavy trampling or traffic. There is little if any place for seedings of meadow fescue in Ohio.

For seeding mixtures containing fescue see page 16.

Orchardgrass

Orchardgrass is a tall-growing, high-yielding, perennial bunch grass. It matures earlier than timothy or bromegrass and becomes woody and unpalatable at maturity. Orchardgrass makes more summer growth than timothy; its inclusion in seedings with ladino clover reduces the hazards of livestock bloat.

Because of its early maturity the first growth of orchardgrass is usually best utilized by pasturing or harvesting for silage. Orchardgrass should not be permitted to mature seed. Orchardgrass establishes well in spring or summer seedings. Seedings made in the fall in wheat are seldom successful.

Orchardgrass

When late-harvested orchardgrass hay is fed to livestock the manure will contain large quantities of viable orchardgrass seed. Orchardgrass spread in manure can become wide-scattered over the farm and become a serious weed.

Later-maturing varieties of orchardgrass should be seeded where the seeding cannot be harvested early. These later-maturing varieties yield as much as common orchardgrass and mature approximately ten days to two weeks later than common.

For seeding mixtures containing orchardgrass see page 12–14.

Rape

Dwarf Essex Rape is an annual pasture plant which has been used for sheep or swine pastures. It may be sown at any time between April 1 and June 1 and is ready to graze within 40 days after sowing. Rape remains palatable for a period of approximately six weeks after grazing has started. Rape is a high protein forage but is not a legume; hence considerable nitrogen must be furnished for it. In most situations other types of pasture are more productive and more satisfactory than are rape pastures.

For seeding recommendations see page 15.

Reed Canarygrass

Reed canarygrass is a coarse-growing perennial which provides pasture in areas that would otherwise grow sedges and similar wet-land plants. It is not as palatable as most other common forage grasses. August or early September is the best time for seeding; however, reed canarygrass can be established from spring seedings.

In areas that are too wet for ordinary seeding methods, reed canarygrass can be established by removing sod from an area where it is well-established and spreading the shredded sod with a manure spreader over the area to be established.

For seeding recommendations see page 14.

Rye

Rye is an annual small grain which may be used for fall and spring pastures or as a cover crop. Rye is extremely winter-hardy and is adapted to a wide range of soil conditions. For fall pasture it should be seeded during mid-August. The Balbo variety is superior to common rye for pasture because of its more rapid growth in the fall and early spring. In most farming operations rye should be considered as an emergency pasture; perennial grasses and legumes are generally more useful for pasture than rye.

Rye should not be permitted to mature seed on rotated cropland. Because of its tendency to shatter seed when ripe, once rye has matured in a field scattered plants will be found in this field for several years. Rye is particularly objectionable when it becomes mixed with wheat.

For seeding recommendations see pages 15 and 16.

Ryegrass

Ryegrasses have been used as winter cover crops for erosion control. They may be sown in corn or alone following other crops. Ryegrasses have a remarkable ability to start under dry and otherwise unfavorable conditions such as seeding in corn and to make a heavy sod in a short time after such seedings. In general they are better cover crops than rye, making a finer growth, a larger root growth and more palatable pasture.

When ryegrasses make considerable fall growth they may be killed during the winter by leaf diseases. When this occurs their value as winter cover and green manure crop is greatly reduced.

Annual or Domestic ryegrass grows more rapidly but is less winterhardy than perennial. In some areas **perennial** (English) ryegrass is used for pasture. In Ohio ryegrass is lower-yielding and shorter-lived than other perennial grasses and is seldom used for pasture.

For seeding recommendations see page 16.

Sudangrass

Sudangrass is a high producing annual grass. It should be seeded about the first of June and makes satisfactory emergency pasture from mid-July until it is killed by frost. Sudangrass has a wide soil adaptation but needs large amounts of nitrogen fertilizers for high yields.

Grazing of sudangrass should be delayed until it has attained a growth of 12 to 15 inches. The prussic-acid content of sudangrass is not increased by frost; the danger of poisoning from grazing frosted sudangrass lies in grazing the very young growth which comes on after frost has killed the original growth. These young shoots are likely to cause prussic-acid poisoning.

Because of its heavy, juicy stems sudangrass is difficult to cure as hay. Sudangrass produces lower yields of silage per acre than corn or the taller growing forage sorghums.

For seeding recommendations see page 15.

Timothy

Timothy

Timothy is the most extensively used tall-growing grass for meadow and pasture seedings in Ohio. It is a shallow-rooted perennial which is adapted to a wide range of soil and climatic conditions. Timothy may be sown in the fall at the time of planting winter grains or in the spring with spring-sown grains. In southern Ohio spring seedings of timothy are less reliable than fall seedings; band seeding improves the chance of success with spring seedings. Timothy may be seeded in late summer (August).

Timothy makes little regrowth following the first hay harvest.

For seeding mixtures containing timothy see pages 12–15.

Why Use Forage Mixtures?

A few legumes and grasses may at times be profitably sown alone especially for seed production or to meet special market demands for hay or meal. However, for most fields, mixtures are better than any one species. There are several reasons:

1. On many soils grasses seeded with a legume protect the legume from heaving.

2. For pasture or silage, mixtures of legumes and grasses are more satisfactory than pure seedings of either. Livestock are less likely to bloat on grass-legume mixtures than when grazing pure legumes.

3. Legume-grass mixtures keep out winter annual weeds better than pure stands of legumes. The fall growth of legumes does not shade out seedlings of winter weeds but grasses between the legumes leave no space for weed seedlings to start.

4. Legume-grass mixtures are preferable to pure stands of grass. Legumes supply nitrogen to the grasses so that they yield more than grasses grown alone without nitrogen fertilization.

5. Grasses grown with legumes contain a higher percentage of protein than grasses grown alone, except where pure stands of grass are heavily fertilized with nitrogen.

Forage species differ widely in growth characteristics and dates of maturity. Simple mixtures containing one grass and one legume are almost always more satisfactory than "shotgun" mixtures containing several different grasses and legumes.

See Ohio Extension Bulletin 347 for information regarding forage crop varieties recommended for use in Ohio.

Seedings for Hay, Silage or Pasture on Rotation Cropland

Seeding No. 1:

Alfalfa—10 pounds

This seeding should be used where there is a special market for alfalfa hay or for artificially dried meal. This seeding is less desirable than alfalfa-grass mixtures for on-the-farm consumption as hay, silage or pasture. The first cuttings from pure stands of alfalfa are somewhat lower in yield than from alfalfa-grass mixtures; pure stands of alfalfa are more susceptible to winter heaving than are those containing a grass.

Seeding No. 2:

Alfalfa—10 pounds
WITH
Timothy—2 pounds (fall) or
4 pounds (spring)
OR
Bromegrass—6 pounds
OR
Orchardgrass—4 pounds

These alfalfa-grass mixtures should be used in rotations including one or more years of meadow. The first cutting from

such mixtures will be less weedy than from straight alfalfa. When timothy is the grass, the second and third cuttings will be almost pure alfalfa; orchardgrass and bromegrass make considerable regrowth and the second and third cuttings from these mixtures will contain some grass.

By seeding a portion of the meadow acreage to each of these alfalfa-grass mixtures, the harvest of the first cutting may be spread over a period of 10 to 14 days without suffering a loss of forage quality.

Late maturing varieties of orchardgrass are preferred to common orchardgrass when the first cutting will be harvested as hay.

Seeding No. 3:

Alfalfa—7 pounds and
Red Clover—3 pounds
WITH
Timothy—2 pounds (fall) or
4 pounds (spring)
OR
Bromegrass—6 pounds
OR
Orchardgrass—4 pounds

These seedings are for rotations having one or more years in meadow. They are recommended where lime and fertility levels make success with alfalfa over the entire field doubtful, or for seeding in wheat. If the alfalfa seeded in wheat is unsuccessful red clover will furnish a legume in the meadow for at least one year. These are useful test mixtures for newly limed fields. If the seeding results predominantly in alfalfa over the entire field, it is likely that seeding No. 2 could be used in subsequent years.

Seeding No. 4:

Medium Red Clover—7 pounds
WITH
Timothy—2 pounds (fall) or
4 pounds (spring)

This seeding should be used on fields which will not produce satisfactory stands and yields of alfalfa.

The hay will consist of red clover and timothy at the first cutting and red clover, hay, pasture or seed at the second cutting. Although this seeding is sometimes used for two-year meadows, it is not desirable for this purpose unless timothy seed is to be harvested. When it is necessary to hold this seeding for a second year, the meadow should be fertilized with a high nitrogen fertilizer.

Seeding No. 5:

Birdsfoot Trefoil (Upright)—6 pounds
WITH
Timothy—4 pounds

This seeding is for fields to remain in sod for two or more years. Birdsfoot trefoil will make satisfactory production on soils too wet to support alfalfa. This mixture will mature for hay somewhat later than alfalfa-grass mixtures and thus may be useful in extending the first cutting hay harvest. Because birdsfoot trefoil is slow to establish and yields less than alfalfa, this mixture should be used only where the field is to remain in sod for several years or where poor drainage makes it impossible to produce satisfactory alfalfa meadows.

Seedings for Pasture

(To remain in sod for several years)

Seeding No. 6:

Use seedings numbered 2, 3 or 4 from the previous section plus one-quarter pound of ladino clover. As the tall growing grasses and legumes die out they will be replaced with volunteer bluegrass and white clover. The speed with which bluegrass and white clover will come into these seedings depends largely upon grazing management. In many instances heavy grazing of meadow mixtures will produce a bluegrass pasture almost as quickly as one can be produced by seeding bluegrass. Where a bluegrass pasture is being established in a field in which there has been no bluegrass for several years, or where it is desirable to hasten the establishment of a bluegrass sod, Kentucky bluegrass at the rate of 1 to 2 pounds per acre may be included in the seeding mixture.

Seeding No. 7:

Ladino Clover—1-2 pounds
WITH
Orchardgrass—4 pounds
OR
Bromegrass—6 pounds

The early spring growth from these seedings may be harvested as silage or grazed during the early spring. The seedings are not suited to hay production because of the difficulties in harvesting and curing ladino clover as hay. Orchardgrass and bromegrass will shade out ladino clover unless the first harvest is removed early. These vigorous growing grasses reduce the hazard of bloat from grazing ladino clover.

Seeding No. 8:

Birdsfoot Trefoil—6 pounds
WITH
Timothy—4 pounds

Birdsfoot trefoil is a highly productive permanent pasture legume. It is longer lived than alfalfa and much more productive than white clover. In most instances timothy should be included with the birdsfoot trefoil seeding to increase the production from this seeding during the early years of its establishment. When a birdsfoot trefoil pasture is being established on an old bluegrass sod it is frequently advisable to omit timothy from the seeding.

When the seeding will be grazed rotationally or an occasional harvest removed as hay or silage, the upright types of birdsfoot trefoil should be used. Empire birdsfoot trefoil will stand harder grazing than will the upright types; however both types produce more forage under rotational than under continuous grazing.

Seeding No. 9:

Reed Canarygrass—8 pounds

This coarse growing perennial grass should be seeded only in areas too wet to support other common forage grasses. Because it is seeded in wet swampy areas, the first growth of reed canarygrass frequently cannot be grazed. Where practical, this early growth of reed canarygrass may be chopped from the field and used as bedding thus permitting some regrowth. Young succulent reed canarygrass is much more palatable than are mature plants.

Seeding No. 10:

Korean Lespedza—8 pounds

This annual legume should be seeded only in pastures in which there is considerable bare ground. It will not establish in a bluegrass sod. Perhaps the best method of handling Korean lespedeza is to seed it on a poor pasture and then supply sufficient lime and fertilizer that more desirable species will crowd out the Korean lespedeza.

Special Pastures

Poultry Pasture

Seeding No. 11:

Ladino Clover—1-2 pounds
WITH
Timothy—4 pounds

In Ohio, ladino clover furnishes the best poultry pasture. When seeded with timothy the stand will be less weedy and less susceptible to winter injury than are pure seedings of ladino clover. This seeding will make little growth during periods of dry weather.

Swine Pasture

Seeding No. 12:

Alfalfa—8 pounds and
Ladino Clover—½ pound
WITH
Timothy—2 pounds (fall) or
4 pounds (spring)

A mixture of alfalfa and ladino clover furnishes excellent pasture for swine. Timothy is included in this mixture because grass-legume mixtures are less weedy and less susceptible to winter injury than are pure seedings of legumes.

Annual Pasture

Seeding No. 13:

Sudangrass—25-30 pounds

Sudangrass furnishes the best emergency pasture for general livestock. While it makes a highly satisfactory pasture it is usually less economical than a pasture program in which perennial grasses and legumes furnish grazing throughout the summer season. Straight seedings of sudangrass furnish more grazing than mixtures of sudangrass with soybeans.

Seeding No. 14:

Dwarf Essex Rape—6 pounds

This seeding has been used as an emergency pasture for sheep or swine. Seedings made during April and early May for sheep pasture are frequently mixed with oats; however the total forage production from such mixtures is no greater than from a pure stand of rape.

Seeding No. 15:

Rye—2 bushels

Rye may be used for supplemental fall or spring grazing. For maximum fall pasture, rye should be seeded during mid-August. Although rye makes considerable early spring growth, it frequently cannot be grazed because of damage to wet soils by tramping of grazing livestock.

Green Manure and Cover Crops

Seeded in Small Grains

Seeding No. 16:
Sweetclover—10 pounds

Biennial white or yellow sweetclovers to be used for green manure crops should be seeded in small grains during early spring. Where satisfactory stands and growth of these legumes are obtained, they fix about 100 pounds of nitrogen per acre. Sweetclover seedings should not be clipped following grain harvest. On fertile soils sweetclover may make such rank growth that it interferes with grain combining. When this is a serious problem it is advisable to use other green manure crops or to seed the sweetclover 10 days after sowing the oats.

Seeding No. 17:
Southern Alfalfa—10 pounds and
Ladino Clover—½ pound

This seeding is the best substitute for sweetclover. It should be used: 1) where sweetclover weevil makes successful seeding of sweetclover hazardous, and chemical control of the weevil is not practical, 2) where it is desirable to clip the seeding for weed control following grain harvest, or 3) where sweetclover makes sufficient growth to interfere with grain harvest. This mixture will fix less nitrogen than will sweetclover which makes normal growth.

Seeded in Corn

Seeding No. 18:
Kentucky 31 or Alta Fescue—10-15 pounds

These vigorous growing perennial grasses are readily established in corn planted at normal row widths. Seed should be broadcast immediately following the last corn cultivation. Fescues are not susceptible to common leaf diseases.

Seeding No. 19:
Field (Annual) Bromegrass—10-15 pounds

Field bromegrass is a relatively new cover crop in Ohio. It should be seeded immediately following the last corn cultivation. Field bromegrass will make little growth until corn has matured; it remains alive over winter and makes a vigorous spring growth. It is an annual which matures seed during early June. Field bromegrass should not be permitted to produce seed; if soils become infested with the seed it can become as serious a weed as cheat or chess. Field bromegrass is not susceptible to common leaf diseases.

Seeding No. 20:
Common (Domestic) Ryegrass—15-20 pounds

Until recently ryegrass has been the standard cover crop for seeding in normally spaced corn. Ryegrass seeded at the last corn cultivation will make considerable fall growth. It is susceptible to leaf diseases and frequently is killed during the winter months. Where leaf diseases reduce the effectiveness of ryegrass as a cover crop, it is advisable to use Alta or Kentucky 31 fescue of field bromegrass.

Seeding No. 21:
Rye—2 bushels

Rye to be used as a cover crop may be broadcast from an airplane into standing corn. When seeded in this manner, the seeding should be delayed until the lower

corn leaves begin to die. Stands frequently are uneven; many complete failures have resulted from this seeding method. In many instances, it is advisable to delay seeding until weeds growing in the corn have been killed by a heavy frost. Where successful, such seedings will supply some winter cover and make vigorous spring growth. Rye is extremely winter hardy and is not killed by common leaf diseases.

Making the Seeding

The establishment of good stands is probably the most difficult part of any forage crop improvement program. Good seeding methods can make the difference between success and failure in forage seedings.

The development of forage seeding equipment has lagged behind the development of equipment for planting other farm crops. In addition, the small size of most forage crop seed makes seeding difficult.

There are many hazards in forage crop establishment and strict attention to the suggestions contained in the following sections of this bulletin will result in greatly improved meadow and pasture seedings on many Ohio farms.

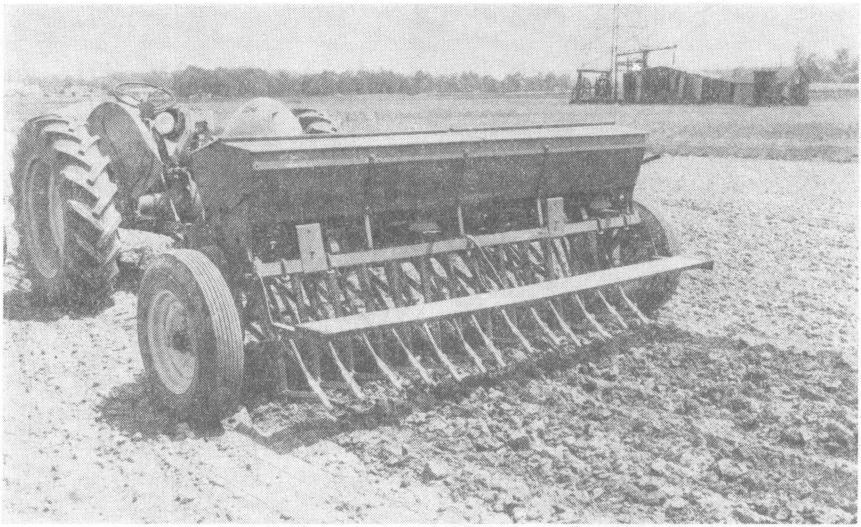
Considerations Applying to All Seedings

1. Lime. Soil tests furnish the only reliable guide to lime needs. Where needed, lime should be applied in recommended amounts as early as possible in the preparation of the seedbed.

2. Fertilization. Phosphorus is especially important in stimulating root growth of forage seedlings and should be applied as near the seed as is safely possible.

Nitrogen fertilizers stimulate increased seedling growth of grasses planted on all except very high nitrogen soil. Applications should range from 10 to 20 pounds of elemental nitrogen per acre. The use of large amounts of nitrogen fertilizers on companion grain crops frequently results in a vigorous growth of the grains and a complete or partial failure of the forage seeding.

Potassium needs of young seedlings can usually be supplied from the soil; however, established stands of forage crops are heavy users of potassium. Part of the potassium needed for later growth can be supplied at seeding time.



A drill equipped for band seeding.

Fertilizer needs—amount and analysis—should be determined by soil tests. Large amounts of fertilizer can safely be broadcast and worked into the seedbed or applied by the band seeding method. The total nitrogen and/or potassium drilled in direct contact with legume seed should not exceed 25 pounds per acre.

3. Legume Inoculation. Legume seed should be inoculated with the nitrogen-fixing bacteria adapted to the crop being sown. The preferred inoculation procedure for any legume not previously grown on the field is as follows:

1) Dampen the seed with sugar water. Use as much sugar as will dissolve in the water.
2) Add inoculant and mix thoroughly.
3) Mix cornstarch, dried skim milk or similar material with the seed until it will flow freely.
4) Seed at once. If the seeding is not completed in one day, the seed should be reinoculated before it is sown.

4. Band Seeding. In band seeding, the forage crop seed is placed directly above but not in contact with the band of fertilizer. Where seedbed conditions permit its use, band seeding is perhaps the best insurance against stand failures. Band seeding results in more vigorous forage seedlings and less weedy stands than broadcast seedings. In summer seedings the band seeding method is especially important.

For best results the band seeding operation should:

1) Place the band of fertilizer approximately one inch below the soil surface.
2) Place the legume and/or grass seed on the soil surface directly above the fertilizer band. This is accomplished by adjusting the seed tubes to drop the seed over the center of the furrow made by the disk.
3) Avoid coverage of the forage crop seed by soil thrown by the moving disks. This is accomplished by adjusting the seed tubes to drop the

seed well behind the drill disks—9 to 16 inches—depending upon the condition of the seedbed, the rate of travel, and the depth of drilling. Heavy spring pressure on the disks will place the fertilizer too deep and cause excess soil movement. The ridges of loose soil caused by deep drilling are a hazard to the seeding for several weeks. Rains after seeding will level these furrows and cause deep coverage of the seed or young seedlings.

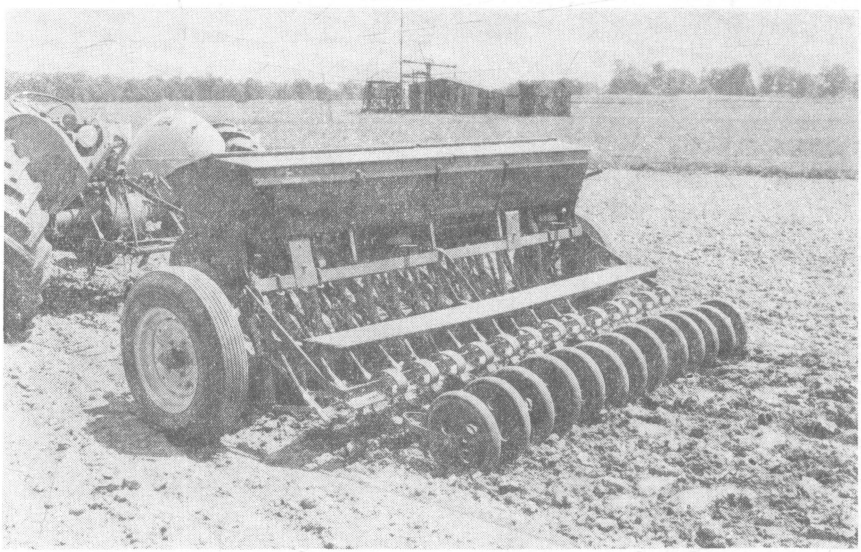
4) Packer wheels, attached to the drill behind the band seeding tubes and in line with them, firm the seed into the soil. This often results in more rapid germination and better stands of forage crops. The use of a cultipacker or land roller following band seeding may level the drill furrows and cover the forage crop seed too deeply. This usually occurs on a well-prepared seedbed that has been plowed.

Seedbed preparation — A firm, well-settled seedbed is desirable for any band seeding operation and is essential for summer seedings.

Fertilizers—With band seeding, up to 600 pounds per acre of standard grade fertilizers may be used at seeding time.

Converting grain drills for band seeding—Some later model grain drills are equipped to band seed. Most older drills require some adaptations. Commercial band seeding kits can be used on most drills; band seeding attachments may be home-made from ordinary garden hose and suitable mounting brackets. The following points are important in all band seeding operations.

1) Seed tubes should be so adjusted that the seed is discharged 9 to 16 inches behind the rear edge of the disk.
2) The lower end of the seed tube should be about 1½ inches above the bottom of the disk furrow as the drill is in operation.



Packer wheels improve stands from seedings made under unfavorable conditions.

3) It is necessary to check the drill in the field to be sure it is doing a satisfactory job of band seeding.

5. Companion Crops. Small grain companion crops are used in Ohio for several reasons:

1) They provide a crop from the land during the seeding year.
2) Where companion crops are not used a more harmful crop of weeds may take their place.
3) On sloping land, companion crops reduce soil losses from erosion.
4) Winter grains reduce early-sown legume losses from freezing or drying soon after germination.

Experience in all parts of Ohio indicates that alfalfa stands usually are better when alfalfa is seeded in oats than when seeded in wheat. Wheat is sometimes superior to oats as a crop in which to sow red or ladino clovers; red clover suffers severely from late seeding and seedings can frequently be made earlier in wheat than in oats. Companion crops should never be used in summer seedings.

6. Clipping Grain Stubble and Removing Combined Straw. It is generally advisable to clip the stubble and remove both the straw and stubble soon after combining. Leaving both the standing stubble and the combined straw on the land usually results in serious injury to the new seeding.

When the straw growth is not heavy, taking off the combined straw without clipping the stubble is sometimes nearly as satisfactory as clipping and removing all, but it leaves more trash in next year's hay. When clipping alfalfa or red clover the mowing machine cutter bar should be set as low as possible. Clipping high will not control the weeds as well as clipping low, since most broad-leafed annual weeds recover from buds along the stem. Alfalfa and red clover recover from the crown regardless of the height of clipping. When clipped during the seeding year, sweetclover does not recover from the crown; it should be cut as high as possible, if weed control makes clipping necessary before September. Late cut sweetclover may be cut low; it will make little or no regrowth during the fall months.

7. Fall Clippings or Pasturing of the New Seeding. Spring seedings of all legumes except sweetclover should be clipped about the middle of August but not later than September 1 of the seeding year. This clipping results in cleaner hay and frequently in higher yields during the following year. If the growth is sufficient to cause smothering, the clippings should be removed.

Sweetclover should not be clipped or pastured during the seeding year except as noted above.

New seedings of alfalfa and red clover may be grazed instead of clipped; the livestock should be removed as soon as the growth is eaten low. New seedings should not be clipped or grazed after September 1 in northern Ohio or September 10 in southern Ohio. Many new seedings are injured or destroyed by over-grazing during the seeding year.

Seeding in Fall-Sown Small Grains

Since wheat is the predominant fall-sown grain in Ohio, it is the crop referred to in this section. The same general rules, with noted exceptions, apply to fall-sown barley or rye.

Rate of Sowing Wheat. Reducing the seeding rate of wheat does not result in better forage stands. In most seasons, stooling equalizes the stand from any reasonable variation in wheat seeding.

Rate of Seeding Timothy (Fall). Tests in all parts of Ohio indicate that when timothy is sown at the time of seeding wheat, two pounds per acre is ample, and that higher timothy seeding rates reduce the stand of spring-sown legumes. With good seeding methods and productive soils, one pound of timothy is adequate.

Topdressing with Manure or Straw. During fall or winter when the ground is dry or frozen and before the legumes are seeded, apply 4 or 5 tons of strawy manure or 1 to 1½ tons of straw per acre. With limited amounts of such topdressing materials, applications should be made first on the sloping and less productive parts of the field.

These topdressings insulate the soil, conserve soil mosture, provide seed coverage, protect the small seedlings first from freezing and later from drying, and provide small quantities of plant nutrients. No single practice will do more to improve stands of clover and alfalfa in wheat. Use only manure that contains considerable amounts of straw or other bedding material. The high nitrogen content of straight manure may result in a rank growth of the wheat crop to the detriment of forage seedings.

Time of Seeding in Wheat. Alfalfa and red clover may be seeded at the same time. The most favorable times for seeding forages in wheat are given in the following table:

Most Favorable Period to Seed Forage Crops on Wheat

Meadow Crop	Time Recommended for Seeding	
	In Southern Ohio	In Northern Ohio
Alfalfa and mixtures with alfalfa	March	March 10-April 10
Red clover	March	March 10-April 10
Sweetclover (scarified)	March	March 10-April 10
Timothy	At time of seeding wheat	At time of seeding wheat
Orchardgrass	March	March 10-April 10

Drilling or Broadcasting. Forage seeds that are covered slightly will germinate more quickly and uniformly, and fewer seedlings will be killed by freezing or drying than when the seed lies exposed on the surface of the soil. As soon as the soil is dry enough, drilling will give better results than broadcasting because of seed coverage. However, it is usually advisable to broadcast the seed at the earliest recommended date rather than wait beyond the favorable dates merely to make drill-

ing possible. Seed coverage is seldom necessary in March because the soil surface does not dry enough to prevent germination or to kill germinating seedlings.

Drilling Fertilizer with the Seed. Two hundred pounds per acre of 0-20-0 drilled with the seed will aid in the development of the legume seedlings. Fertilizers high in nitrogen or potash should be avoided because of the danger of fertilizer injury.

Legumes to Sow in Wheat. Legumes sown in wheat must compete with an established crop that shades the seedlings as soon as they germinate. When sown in oats, the legume seedlings are not overshaded until the oats reach the jointing stage. Alfalfa is more sensitive to this shading than red clover, and thus alfalfa is less certain than red clover to establish in wheat. Alfalfa, and red clover to some extent, will be helped by anything that reduces or removes the wheat growth in April and lets the sunlight in on the young legume seedlings.

Pasturing the Wheat. If wheat is making such a rank growth that it is likely to lodge it may well be pastured with cattle or sheep for a period of 10 to 15 days during the last half of April. Such pasturing may reduce the yield of wheat, but it results in better stands of legumes by reducing the competition between the wheat and the young legume seedlings at a critical time in seedling development.

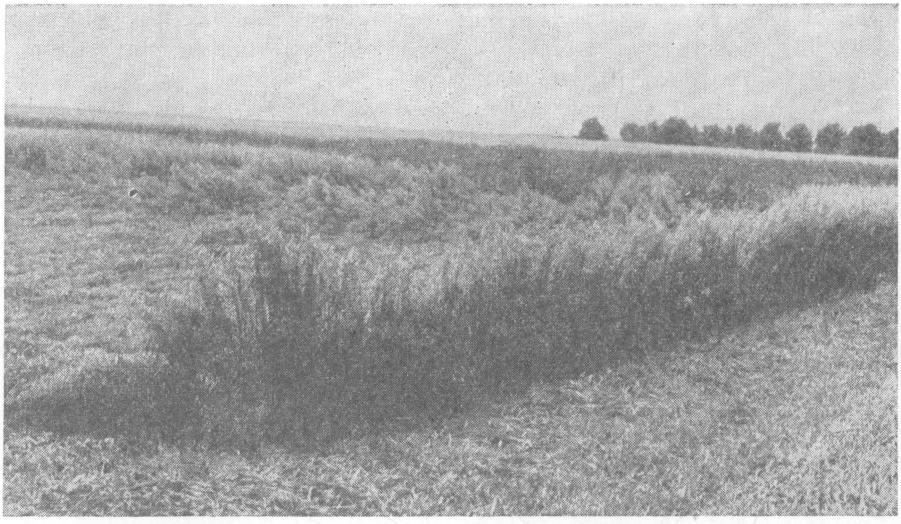
Clipping the Wheat. If the rank wheat growth in April cannot be pastured, clipping with the mowing machine just before the jointing stage will accomplish the same end. Care should be taken to avoid cutting off the developing wheat heads. The best stage for clipping does not last more than five days and usually occurs about April 15 to 30. The height of the wheat head can be determined by splitting several young stems of wheat. After the heads are more than an inch or two above the ground surface, it is too late to clip without seriously reducing wheat yields. If the unclipped wheat does not lodge, clipping the wheat will result in a loss of 3 to 6 bushels of wheat per acre but it may result in a better stand of legumes. If the unclipped wheat lodges the clipped wheat may yield more.

Seeding Failures in Wheat. A wheat crop that is fertilized and managed for high yields competes seriously with developing alfalfa plants. The farmer who grows heavy crops of wheat frequently experiences failures of alfalfa seeded in wheat. In such situations it often is advisable to make summer seedings following wheat harvest. With proper seeding methods the hazards of summer seedings can be reduced. (See pages 23 and 24.)

Seeding in Spring-Sown Small Grains

Seeding Methods. Band seeding is the preferred method of making spring seedings. (See pages 18–20.) When band seeding is not practiced the delivery tubes of the grass seed attachment should be lengthened to deliver the forage seed behind the grain disk and into the covering chains. An alternative method is to broadcast the forage seed after sowing the grain. On soils where sweetclover may interfere with the combining of oats, sweetclover seeding may be delayed 10 days after oats planting.

Pasturing or Harvesting the Oats as Hay. Pasturing or harvesting the oat crop



Lodged grain must be removed at once, if the new seeding is to be saved.

as hay may result in greatly improved forage stands. Greatest stand improvements are realized during dry seasons or in fields in which the grain would have lodged if not harvested before maturity. Lodged grain must be removed from the field at once after lodging, if the new seeding is to be saved.

Seeding Without a Companion Crop

Spring Seedings. Band seeding alone in April or May on a well-settled, well-prepared seedbed is a very sure method of obtaining stands of meadow crops where weeds or erosion are not serious. Weeds in seedings made without a companion crop can usually be controlled by clipping. Do not clip too soon or too frequently. Allow the weeds and forage seedlings to grow together until the meadow seeding is in real danger of being smothered. Then clip as low as possible. This first clipping will usually come in July. Since sweetclover cannot be clipped in the seeding year without serious injury, it should be sown without a companion crop only on unusually clean land.

Summer Seedings. Band seeding has reduced the risk of summer seeding alfalfa. If summer seedings are attempted, precautions should be taken to avoid erosion. An advantage of summer seeding is that liberal applications of fertilizer can be made without stimulating the growth of competing crops.

Seedbed Preparation. Disking may be enough tillage. This leaves a firm seedbed which is essential for fast germination and seedling growth. If necessary to plow, plow well ahead of seeding date. The earlier the preparation of the seedbed is started, the better chance there will be for rainfall to settle the loose soil and be absorbed as a reserve supply of moisture, and the more weed seedlings that can be killed by additional tillage. In normal or dry seasons, more moisture is conserved by disking than by plowing.

Time of Summer Seeding. Five to seven weeks of good growing weather are required for an alfalfa seedling to establish itself in the fall. In northern Ohio this means planting before the first of September. In southern Ohio September 15 is considered the latest safe date for summer seeding. Control of volunteer grain is the main reason for delaying seeding; otherwise, the earlier alfalfa and yellow sweetclover are seeded the better chance they will have to become established before winter.

Red, alsike, ladino clovers and birdsfoot trefoil will not do as well as alfalfa in a summer seeding.

Bromegrass and timothy usually establish well with alfalfa in an August seeding.

Companion Crops. Do not use companion crops in summer seeding; any companion crop competes with and will probably smother the legume seedlings.

Volunteer Grain. Volunteer grain is one of the most serious problems in making summer seedings after small grain harvest. The difficulty can be reduced by disking immediately after grain harvest so that every opportunity is given the grain to sprout. Plowing, instead of disking, and seeding later in August reduces the difficulty.

Making the Summer Seeding. The band seeding method (see pages 18–20) is essential in making a summer seeding. Prepare a firm seedbed and use a land packer after band seeding. Do not use the land packer after band seeding if leveling of the drill furrows means covering the seed too deep.

Packing wheels attached to the drill behind the band seeding tubes and in line with them will usually improve germination. This is a better practice than using the land packer after band seeding.

Mulching a Summer Seeding. The application of 4 or 5 tons per acre of strawy manure or 1 ton of grain-free straw immediately after seeding is very beneficial. Apply with a spreader in a thin uniform dressing. Such a mulch conserves moisture near the surface where the seedlings need it and tends to prevent the formation of a crust. It also reduces the temperature of the soil in the summer and offers some protection from winter heaving.

Do Not Clip a Summer Seeding. Exceptions may be made only for June or early July seedings which are overgrown with weeds and can be clipped before September 1.

Topdressing the Summer Seeding. During the fall or early winter, topdress with 6 to 8 loads of manure per acre unless a mulch of manure or straw was applied immediately after seeding.

Reseeding Pastures Without Plowing

Trash Mulch Seedings. The trash mulch method was specifically developed for the introduction of forage mixtures containing alfalfa into poverty grass hill land. This method of seedbed preparation is particularly adapted to situations in which the use of conventional seedbed preparation would create a serious erosion hazard. The trash mulch method may be used for seeding meadows or pastures without plowing in poverty grass, broom-sedge or similar readily disked sods. The trash mulch method is less reliable and more costly than plowing and conventional seedbed preparation on such vigorous sods as bluegrass. With vigorous grass sods, shallow plowing followed by disking is preferable to plowing at the normal depth.

Herbicides as an Aid in Seedbed Preparation. Chemical herbicides have caused a renewed interest in the practice of reseeding fair to good grass sods without plowing. The use of herbicides permits a complete kill of the old sod without plowing or repeated disking. The combination of herbicides with minimum disking or other "trash mulch" seedbed preparations permits seedings of birdsfoot trefoil on areas where plowing would create a serious erosion hazard.

The use of herbicides in connection with trash mulch seedings of birdsfoot trefoil is a recent development, and the following suggested systems of seedbed preparation may be altered as additional information becomes available.

Seedbed Preparation. The two chemicals that have shown greatest promise in pasture renovation are dalapon (2, 2-dichloropropionic acid) and amino triazole (3, amino-1,2,4-triazole).

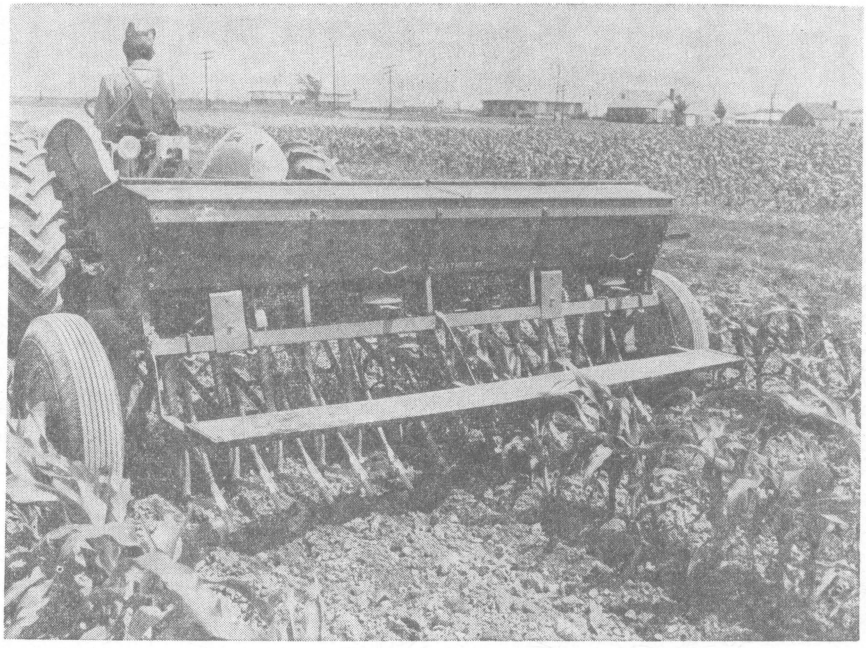
Fall treatments should be applied between September 15 and October 15, using dalapon 5 to 10 pounds active ingredient per acre, or amino triazole 3 to 6 pounds active ingredient per acre in 30 to 50 gallons of water per acre. Disk the soil thoroughly 2 to 5 days after application of the herbicide. If disking is impractical the herbicide should be applied at twice the above rates. Band seed trefoil 6 pounds per acre with 500 pounds of fertilizer in early spring (March 15 to April 10).

In a spring treatment apply dalapon 5 to 10 pounds active ingredient per acre in 30-50 gallons of water soon after the bluegrass begins spring growth. Two to five days after the dalapon is applied, the land should be thoroughly disked. Birdsfoot trefoil can be band seeded immediately at 6 pounds per acre.

Amino triazole is not recommended for a spring treatment because of the necessary delay between spraying and seeding. In general, fall sprayings are preferred to spring because this permits earlier spring seeding of the trefoil.

Management During the First Summer. As with all new seedings, if the area becomes weedy, allow the weeds to grow with the legume until there is danger of smothering the forage crop. At this point clip the weeds low. Clip as often as necessary to prevent smothering of the legume but do not clip after September 1.

In favorable seasons, there may be sufficient growth to justify removal of the crop either as hay or by light pasturing. Do not clip or graze after September 1.



Band seeding in wide-row corn.

Seeding in Corn

Seedings in corn are special cases of summer seeding, and all of the precautions of summer seeding should be observed. The corn in this case competes severely for light and moisture, making it a hazardous operation.

Crops for Seeding in Corn. Recent research has demonstrated that the following species are superior for use as green manure crops in corn: Kentucky 31 or Alta fescue, field (annual) bromegrass, common ryegrass, and rye. (See pages 9, 10, 11 and 16 for further discussion of these species.)

Making the Seeding. Seed as early as possible—while the corn is small enough not to interfere with seeding. This will mean that the last cultivation should be made earlier than normal.

Fairly satisfactory stands of the recommended species are usually obtained by broadcasting the seed immediately following the last corn cultivation. However, as with other summer seedings, band seeding is superior to broadcasting the seed. The use of packing wheels further improves the chances of forage crop establishment.

Experimentally, seedings in corn have been much more successful when the corn is planted in wide rows—60 to 70 inches apart.

To Make More Profit from Forage Crops

1. Use a seed mixture adapted to your conditions
2. Apply fertilizer and lime according to soil test recommendations.
3. Sow at the proper time on a suitable seedbed.
4. Band seed where possible.
5. Manage the seeding to insure its survival.
6. Market forages through efficient livestock or use them for cover or green manure

Other Information You May Want

The Agricultural Extension Service has many other bulletins and leaflets on various phases of crop culture. You may secure copies of these by contacting your county Agricultural Extension office.